exceeding a restriction of the wavelength of light. By using the light probe microscope, it is possible to observe an optical picture with a resolving power exceeding an optical image which has been measured by using a conventional optical microscope and a highly sensitized camera and, at the same time, a surface shape can be observed as well.--

Please replace the paragraph beginning at page 1, line 19, with the following rewritten paragraph:

--In the light probe microscope, it is necessary to detect a weak light such as scattered light and fluorescent light radiated from the sample surface adjoining the light field locally existing at the probe tip. However, in the conventional light probe microscope, there are used a photomultiplier and an avalanche photodiode as a light detector.--

Please replace the paragraph beginning at page 2, line 3, with the following rewritten paragraph:

--Since a feeble light is detected in the light probe microscope, stray light is picked up in the photomultiplier whose light-intercepting face is large, so that noise becomes high. For example, where light from a

probe having an optical aperture of 100 nm is converged by an objective lens having a magnification of 100 times, a size corresponding to the aperture becomes 10 μm in a primary picture. In contrast to this, a size of the light-intercepting face of the photomultiplier is several mm to several tens of mm, so that a major region does not contribute to detection, reacts with the stray light, and becomes a source of a dark count noise. In order to eliminate the stray light, it has been considered to insert a pin hole to an image formation face, but it is a very difficult operation to align an optical axis of the feeble light therewith. On the other hand, in the avalanche photodiode, the light-intercepting face is as relatively small as about 200 to 500 μm, so that it is not easily influenced by the stray light. However, also in this case, it is necessary to align the optical axis, so that a measuring operation becomes complex.--

Please replace the paragraph beginning at page 3, line 14, with the following rewritten paragraph:

--That is, in the present invention, there has been realized a light probe microscope having a probe capable of generating light field locally existing in a tip portion, probe position detecting means for controlling a distance between a tip of the probe and a sample to an adjoining

distance, tremor or oscillating means and control means, scan means for two-dimensionally scanning the probe on a sample surface, a light source for generating the locally existing light field, an optical system for converging a light radiated from the sample surface adjoining the probe tip, and data collecting means, characterized in that a two-dimensional image of the sample surface is obtained in real time by two-dimensional image snesor, and a two-dimensional light image is extracted simultaneously with a shape image by means of obtaining a signal intensity of an optional detection region in the two-dimensional image by picture signal processing means.--

Please replace the paragraph beginning at page 4, line 6, with the following rewritten paragraph:

--Further, it becomes possible to selectively obtain a light signal of specified wavelength by disposing a spectroscope in a front stage of the two-dimensional image sensor. Besides, by means of constructing the converging optical system with an optical system containing a polarizer and a mirror, different polarization components can be made to form images in separate positions on the two-dimensional image sensor, and either polarization component can be selectively detected. Similarly, by constructing the converging optical

system by an optical system containing a dichroic mirror and another mirror, different wavelength components can be made to form images in separate positions on the two-dimensional image sensor, and either wavelength component can be selectively detected. Here, a plurality of the detections region are simultaneously set and plural light images can be simultaneously obtained. By this, it is made possible to observe plural light images without using plural detectors.--

Please replace the paragraph beginning at page 5, line 4, with the following rewritten paragraph:

--Incidentally, in the picture signal processing means, signal processing is performed by means of digitizing a video signal, calculating a light intensity of the detection region, and transmitting it to the data collecting means as a digital value intact or after being converted into an analog value.--

Please replace the paragraph beginning at page 5, line 14, with the following rewritten paragraph:

--Incidentally, according to knowledge of the present inventor, there is an example in which the two-dimensional image sensor is utilized as observing means in order to examine a scattered state of the light from the

probe, but there is no example in which it is used as a light detector in a probe scanning time.--

Please replace the paragraph beginning at page 6, line 21, with the following rewritten paragraph:

--Hereunder, an embodiment of the present invention with reference to the attached drawings.--

Please replace the paragraph beginning at page 6, line 23, with the following rewritten paragraph:

--Fig. 1 shows one constitutional diagram of a light probe microscope of the present invention. In Fig. 1, it has a probe 11 having a light field locally existing in the vicinity of a tip portion thereof, probe position detecting means 12 for detecting a distance between a tip of the probe 11 and a sample to an adjoining distance, tremor or oscillating means 13 and control means 14 for controlling the distance between the probe tip 11 and the sample, scan means 15 for two-dimensionally scanning the probe on a sample surface, a light source 16 for generating the light field locally existing in the vicinity of the probe tip, an optical system 17 for converging a light radiated from a sample 21 surfaces adjoining a probe 11 tip, and data collecting means 18, and further has a two-dimensional image sensor 19, and

picture signal processing means 20. Here, a two-dimensional image on the sample 21 surface is obtained in real time by the two-dimensional image sensor 19, and it is made possible to optionally obtain a signal strength of a detection region in the two-dimensional image by the picture signal processing means 20. Concretely, in case that a tip of the probe 11 is adjacent to the surface of the sample 21, the scattered light generated between the probe and the sample is observed as such a spot-like bright point 31 shown in Fig. 2A on the two-dimensional image sensor 19 placed in an image formation face. Here, by designating a range 32 (Fig. 2B) surrounding the pixels of a portion of the bright point 31 to thereby obtain a brightness of this portion in real time and by transferring it to the data collecting means 18, a data of a light intensity can be obtained simultaneously with a shape information, so that there can be realized a light probe microscope for simultaneously observing the shape picture and the two-dimensional light picture.--

Please replace the paragraph beginning at page 8, line 3, with the following rewritten paragraph:

--In this manner, by designating a measuring region in agreement with the bright point, it is possible to eliminate the problem in which excessive stray light is

detected by a detector having a light-intercepting face that is large with respect to the size of the bright point, and the problem of the optical axis alignment when a detector having a small light-intercepting face in the order of the bright point is used. Particularly, in case of a micro light cantilever using a micro processing technique, it follows that an excited light is directly introduced from a back side of the micro aperture, but in this constitution there is a case that the light leaks from a side face of the cantilever, and a system of the present invention is particularly useful in a point that only the light of the aperture portion is detected.--

Please replace the paragraph beginning at page 9, line 23, with the following rewritten paragraph:

--Particularly, as shown in Figs. 4A and 4B, in an observation of the spectrum, it is possible to simultaneously obtain plural light pictures by simultaneously setting plural detection regions of the spectrum. In Fig. 4A, there is shown a spectrum band 33 and, in Fig. 4B, there are shown designating ranges 34, 35, 36 surrounding a part of the spectrum band.--

Please replace the paragraph beginning at page 10, line 4, with the following rewritten paragraph:

--By setting the detection region for each of plural different wavelength components in this manner, it is possible to obtain a light picture of each different wavelength component. By means of varying the selected wavelength width in a wavelength direction by continuously narrowing it, it is possible to obtain a light picture for every fine wavelength component, and it is also possible, on the basis of the light picture for every wavelength component, to perform extraction of a spectral spectrum in an optional measuring point in a scanning region. By changing a size of the region of the measuring point for the extraction, it is also possible to adjust a face resolving power in the sample face of the spectrum information, an S/N ratio of the spectrum itself, and the like.--

<u>IN THE CLAIMS</u>:

Please amend claims 1-26 as follows:

1. (Amended) A light probe microscope comprising:

a probe having a tip portion and being capable of generating a light field in a vicinity of the tip portion;

probe position detecting means for detecting a distance between the tip portion of the probe and a sample surface;

control means for controlling the distance between the tip portion and the sample surface;

scan means for two-dimensionally scanning the probe with respect to the sample surface;

a light source for generating light used to produce the light field;

a converging optical system for converging light radiated from the sample surface in response to the light field;

a two-dimensional image sensor for producing a two-dimensional shape image of the sample surface in real time; and

picture signal processing means for producing a two-dimensional light image in accordance with a signal intensity of a detection region in the two-dimensional shape image.

2. (Amended) A light probe microscope according to claim 1; further comprising a spectroscope interposed between the radiated light and the two-dimensional image sensor for selectively obtaining a light signal of a specified wavelength.

3. (Amended) A light probe microscope according to claim 1; wherein the converging optical system comprises a polarizer and a mirror arranged such that different polarization components of the radiated light form images in separate positions on the two-dimensional image sensor.

4. (Amended) A light probe microscope according to claim 1; wherein the converging optical system comprises a dichroic mirror and another mirror arranged such that different wavelength components of the radiated light form images in separate positions on the two-dimensional image sensor.

5. (Amended) A light probe microscope according to claim 1; wherein the picture signal processing means includes means for obtaining a signal intensity of a plurality of separate detection regions in the two-dimensional shape image and producing light images corresponding to the respective detection regions.

6. (Amended) A light probe microscope according to claim 2; wherein the picture signal processing means includes means for obtaining a signal intensity of a plurality of separate detection regions in the two-dimensional shape image and producing light images corresponding to the respective detection regions.

7. (Amended) A light probe microscope according to claim 3; wherein the picture signal processing means includes means for obtaining a signal intensity of a plurality of separate detection regions in the two-dimensional shape image and producing light images corresponding to the respective detection regions.

8. (Amended) A light probe microscope according to claim 4; wherein the picture signal processing means includes means for obtaining a signal intensity of a plurality of separate detection regions in the two-dimensional shape image and producing light images corresponding to the respective detection regions.

9. (Amended) A light probe microscope according to claim 1; wherein the two-dimensional shape image is a video signal, and is updated at a video rate.

10. (Amended) A light probe microscope according to claim 1; further comprising data collecting means for obtaining the two-dimensional shape image and the two-dimensional light image; wherein the picture signal processing means includes means for digitizing a video signal, calculating a light intensity of the detection region, and transmitting the calculated light intensity to the data collecting means as a digital or analog value.

11. (Amended) A light probe microscope according to claim 1; further comprising data collecting means for obtaining the two-dimensional shape image and the two-dimensional light image; and an external data collecting unit separate from the data collecting means for obtaining a picture synchronized with the shape image in accordance with data containing a trigger signal output by the data collecting means.

12. (Amended) A light probe microscope according to claim 5; wherein the picture signal processing means includes means for obtaining a light image for all wavelength components of the light probe microscope by setting a detection region for each of the wavelength components.

13. (Amended) A light probe microscope according to claim 6; wherein the picture signal processing means includes means for obtaining a light image for all wavelength components of the light probe microscope by setting a detection region for each of the wavelength components.

14. (Amended) A light probe microscope according to claim 7; wherein the picture signal processing means includes means for obtaining a light image for all wavelength components of the light probe microscope by setting a detection region for each of the wavelength components.

15. (Amended) A light probe microscope according to claim 8; wherein the picture signal processing means includes means for obtaining a light image for all wavelength components of the light probe microscope by setting a detection region for each of the wavelength components.

16. (Amended) A light probe microscope according to claim 12; further comprising means for extracting a light spectrum from the light image at a measuring point in a scan region of the sample for plural wavelength components by continuously varying the spectrum in a wavelength axis direction.

17. (Amended) A light probe microscope according to claim 13; further comprising means for extracting a light spectrum from the light image at a measuring point in a scan region of the sample for plural wavelength components by continuously varying the spectrum in a wavelength axis direction.

18. (Amended) A light probe microscope according to claim 14; further comprising means for extracting a light spectrum from the light image at a measuring point in a scan region of the sample for plural wavelength components by continuously varying the spectrum in a wavelength axis direction.

19. (Amended) A light probe microscope according to claim 15; further comprising means for extracting a light spectrum from the light image at a measuring point in a scan region of the sample for plural wavelength components by continuously varying the spectrum in a wavelength axis direction.

20. (Amended) A light probe microscope according to claim 5; further comprising a spectroscope for setting a wavelength of excited light at the probe tip outside an image region of the two-dimensional image sensor so that an S/N ratio to a wavelength other than the excited light is improved.

21. (Amended) A light probe microscope according to claim 6; further comprising a spectroscope for setting a wavelength of excited light at the probe tip outside an image region of the two-dimensional image sensor so that an S/N ratio to a wavelength other than the excited light is improved.

22. (Amended) A light probe microscope according to claim 7; further comprising a spectroscope for setting a wavelength of excited light at the probe tip outside an image region of the two-dimensional image sensor so that an S/N ratio to a wavelength other than the excited light is improved.

23. (Amended) A light probe microscope according to claim 8; further comprising a spectroscope for setting a wavelength of excited light at the probe tip outside an image region of the two-dimensional image sensor so that an S/N ratio to a wavelength other than the excited light is improved.

24. (Amended) A light probe microscope according to claim 1; wherein the converging optical system is arranged to converge one of light that has been transmitted through the sample or reflected by the sample.

25. (Amended) A light probe microscope according to claim 1; wherein the converging optical system is arranged to converge light that has passed through an optical aperture of the probe.

26. (Amended) A light probe microscope according to claim 1; wherein an image at a selected portion of the two-dimensional image sensor is continuously preserved in accordance with a trigger signal.

Kindly add the following new claims 27-32:

27. A light probe microscope comprising: a probe having a tip; means for positioning the probe tip closely to a sample surface and causing two-dimensional scanning movement

between the probe tip and the sample; a light source for emitting light to an area proximate the probe tip and the sample; a two-dimensional image sensor for receiving the light radiated from the sample and producing a two-dimensional image of the sample in accordance therewith; and means for producing a light image based on a signal intensity of light in a detection region of the two-dimensional image.

28. A light probe microscope according to claim 26; further comprising a spectroscope interposed between the sample and the two-dimensional image sensor for selectively obtaining a light signal of specified wavelength.

29. A light probe microscope according to claim 27; further comprising an optical system for converging light emitted by the sample surface in response to the emitted light.

30. A light probe microscope according to claim 29; wherein the optical system comprises a polarizer and a mirror arranged such that different polarization components of the converged light form images in separate positions on the two-dimensional image sensor.

31. A light probe microscope according to claim 29; wherein the optical system comprises a dichroic mirror and another mirror arranged such that different wavelength

components of the converged light form images in separate positions on the two-dimensional image sensor.

32. A light probe microscope according to claim 27; wherein the means for producing the two-dimensional light image includes means for obtaining a signal intensity of a plurality of separate detection regions in the two-dimensional image and producing light images corresponding to the respective detection regions.

ADDITIONAL FEES:

A check in the amount of $108.00 is enclosed to cover the cost of 6 claims in excess of those already paid for. Should the check prove insufficient for any reason, authorization is hereby given to charge any such deficiency to our Deposit Account No. 01-0268.

IN THE ABSTRACT:

Delete the abstract now of record and insert therefor the new abstract submitted herewith on a separate sheet.

IN THE DRAWINGS:

Submitted herewith are copies of Figs. 1, 3, 9 and 10 of the application drawings on which have been marked in red proposed drawing revisions. Upon approval of the

revisions and allowance of the application, the formal drawings will be suitably revised.

REMARKS

In order to place this application in better condition for a complete action on the merits, the specification has been suitably revised to correct informalities and to place it in better conformance with U.S. practice. Proposed revisions have been submitted to label boxes in Figs. 1, 3, 9 and 10 of the application drawings, and claims 1-26 have been amended in formal respects to improve the wording and bring them into better conformance with U.S. practice. Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned **VERSION WITH MARKINGS TO SHOWN CHANGES MADE**.

To obtain a fuller scope of coverage, new claims 27-32 have been added. Adequate support for the subject matter recited in these claims may be found in the specification as originally filed.

Early and favorable action on the merits are respectfully requested.

Respectfully submitted,

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MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents & Trademarks, Washington, D.C. 20231, on the date indicated below.

Bruce L. Adams
Attorney Name

Bruce L. Adams
Signature

January 8, 2003
Date